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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHAO-CHENG CHEN, CHEN-NAN YEH and CHIEN-CHUNG
FU

Appeal 2008-3835
Application 10/714,304
Technology Center 2800

Decided: November 7, 2008

Before JOSEPH F. RUGGIERO, ROBERT E. NAPPI,
and KARL D. EASTHOM, *Administrative Patent Judges*.

EASTHOM, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the Final Rejection of claims 1, 4-8, 10-14, 16, 18, and 19.¹ All other pending claims either have been allowed or indicated to be allowable but objected to as dependent (App. Br. 5; Ans. 7). We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Appellants' invention relates to a method of forming a dual damascene opening, comprising *inter alia*, forming a protective film portion over an exposed portion of a conductive layer. (Spec. 3).

Claim 1 is illustrative of the invention and reads as follows:

1. A method of forming a dual damascene opening, comprising the steps of:

providing a structure having an overlying exposed conductive layer formed thereover;

forming a dielectric layer over the exposed conductive layer;

forming an anti-reflective coating layer over the dielectric layer;

etching the anti-reflective layer and the dielectric layer using a via opening process to form an initial via exposing a portion of the conductive layer;

forming a protective film portion over at least the exposed portion of the conductive layer, the protective film portion being comprised of the

¹ The Examiner's statement of rejection erroneously includes claims 16, 18, and 19 as rejected (Ans. 3). That is, the Answer also states that claim 15, from which claims 16, 18, and 19 depend, is allowed (Ans. 7, *see also* Advisory Action mailed December 2, 2005 – allowing claims 2, 3, 9 and 15-50). The Examiner also signifies agreement with the Appellants' statement that claims 2, 3, 9 and 15-50 have been allowed. (App. Br. 5, Ans. 2).

elements C and H; and

patterning the anti-reflective coating layer and the dielectric layer to reduce the initial via to a reduced via and to form a trench opening substantially centered over the reduced via; the trench opening and the reduced via comprising the dual damascene opening.

The Examiner relies on the following prior art references to show unpatentability:

Kawai	2003/0054629 A1	Mar. 20, 2003
Saito	2004/0166669 A1	Aug. 26, 2004

Claims 1, 4-8, and 10-14 stand rejected under 35 U.S.C. § 103 as being obvious based on the collective teachings of Saito and Kawai.

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the (resubmitted) Brief (filed July 24, 2007), Reply Brief (filed July 3, 2007), and Answer (mailed November 9, 2007) for the respective details. Appellants' arguments are directed toward independent claim 1 (App. Br. 9-13).² Arguments which Appellants could have made but chose not to make in the Brief have not been considered and are deemed to be waived. 37 C.F.R. § 41.37(c)(1)(vii).

² Appellant's statement that claims 4-8 and 10-14 depend from and further limit claim 1, and Appellants' general reliance on arguments presented for claim 1 (App. Br. 13), do not constitute a separate argument of patentability for these claims.

ISSUE

Appellants dispute (App. Br. 11-12) the Examiner's finding (Ans. 4) that Saito's protective member 4 constitutes the claimed protective film. Thus, the issue: Did the Appellants demonstrate that the Examiner erred in finding that Saito discloses the protective film of claim 1?

FINDINGS OF FACT (FF)

1. Appellants state: "As shown in Fig. 4, a protective film is deposited over the structure of Fig. 3 to form protective film portions 22 over the patterned ARC layer 18' and a protective film portion 24 over the exposed portion 11 of metal layer 12." (Spec. 8: ¶ 1). The exposed portion 11 of metal layer 12, and the protective film portion 24, reside in a via 20. (Fig. 4, *see also* Spec. 6: last ¶ to Spec. 7, last ¶).
2. A via protective plug 27 can be made of the same material as, and overlays, the protective film 24, within the via 20. (Spec. 8, Fig. 5). "Via plug 27 may be formed of a via plug material *layer . . .*" (Spec. 9: 1st ¶).
3. Saito discloses a protective member 4 formed by electrolysis inside a via hole 3 over an otherwise exposed portion of a conductive (Cu) interconnection 1 in the via. (Figs. 1C, 1D, 1E; ¶¶ 0028 – 0033).
4. The height of the film 4 is less than or equal to the height of the via hole and surrounding "interlayer insulating film" 2 and said height is readily controlled by either electrolysis forming conditions or etching thereafter. (Saito, Figs. 1C, 1D, 1E; ¶¶ 0035, 0036).
5. Kawai similarly discloses: "Thus, as shown in Fig. 1B, an organic film (a protective film) 17 is embedded in via hole 6. . . Thus, by

embedding organic film 17 in via hole 6, the height of organic film from the bottom portion of the via hole 6 can be adjusted easily.” (§ 0053).

PRINCIPLES OF LAW

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

ANALYSIS

Appellants contend that Saito's protective member is described as a *member* or a via fill; but not a film as recited in claim 1. (App. Br. 11, Reply Br. 5). Appellants also contend that describing Saito's via fill member 4 as a film is not consistent with the plain meaning of film (App. Br. 12-13). To support the latter contention, Appellants provide a dictionary definition for "film," to wit: "1 a : a thin skin or membranous covering 2: a thin covering or coating <a *film* of ice> 3: a: an exceedingly thin layer." (App. Br. 12).

We are not persuaded by Appellants' arguments. Rather, we agree with the Examiner that Saito's member constitutes a film because the member constitutes a thin covering or coating. We find that member 4 is thinner than the insulating layer 1 which Saito refers to as a film and it covers the underlying conductor (FF 3, 4). Since the member 4 is thinner

than the “interlayer insulating film” 2 (FF 4), Appellants’ contention that the member 4 is not a film cannot be based on its thinness.

While Appellants note that their disclosed film has a certain thickness and also argue that skilled artisans would not recognize a via fill as a thin film, Appellants also state that “the term ‘thin’ is not present in the claim.” (Reply Br. 6). These arguments do not directly rebut the Examiner’s finding and ours that Saito’s member also constitutes a thin covering. Further, Saito discloses that the member 4 can be made even thinner, without limitation (FF 4).

Appellants’ related argument that “no reputable reference exists in the art that refers to a via fill as a ‘film’” lacks any factual support. Kawai refers to just such a via fill as a film (FF 5). Appellants also refer to a via plug 27 as a layer (FF 2).³ Further, Appellants refer to a similar covering 24 below the via plug inside via fill 20 as a film (FF 2). No argued physical distinction exists between Appellants’ protective film 24 (or via plug layer 27) and Saito’s member 4 – they each reside in vias to protect underlying metal layers (*see* FF 1-3; Spec.: Figs. 5, 6).

For similar reasons, we also are not persuaded by Appellants’ contention that their disclosed CVD (chemical vapor deposition) method of making film 24 renders the claim distinct. (Reply Br. 5, *see also* App. Br. 11-12). Regardless of how Appellants’ film is formed, Appellants set forth no convincing line of reasoning or evidence demonstrating why a skilled artisan would recognize a CVD method as producing a film while Saito’s

³ As indicated *supra*, Saito does not distinguish a layer (i.e., interlayer) from a film. (FF 4).

electrolysis deposition method does not (*see* FF 3). Further, as we noted above, a similar via fill is described in the prior art as a film (FF 5); and likewise, by Appellants, as either a film or layer (FF 1, 2). We find Kawai's prior art protective film 17, and Appellants' protective film 22 or via layer 27, to be the same or similar to Saito's protective member 4 (i.e. film) (*compare* FF 1-5). Each such film or layer serves as a protective covering of an underlying metal coating, and each is thinner than its respective surrounding insulator, which is described as a film or layer. (*See* FF 1-5; Spec. 9-10, Fig. 6 – via film 24 and plug 27' height each less than dielectric layer 16" height).

The Examiner's interpretation of Saito's via fill as a film is consistent with the ordinary meaning of the term. Accordingly, for the reasons discussed above, the Examiner did not error. The Appellants also have not demonstrated error with respect to claims 4-8 and 10 to 14 (*see* n. 1 *supra*).

CONCLUSION

The Appellants did not demonstrate that the Examiner erred in finding that Saito discloses the protective film of claim 1.

DECISION

The Examiner's decision rejecting claims 1, 4-8 and 10-14 is affirmed. No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(2006).

AFFIRMED

Appeal 2008-3835
Application 10/714,304

gvw

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